

Three Species of *Eurytoma* Important in Biological Control of Weeds (Hymenoptera, Eurytomidae)

By B. D. BURKS, Entomology Research Division,
Agr. Res. Serv., U. S. D. A.

This paper includes the descriptions of three species of the chalcidoid genus *Eurytoma* which are of actual or potential importance in projects for the biological control of noxious plants. The first species is a previously undescribed phytophagous one which develops in the seeds of the black sage (*Cordia macrostachya*). It has been introduced from the West Indian island of Trinidad into the Indian Ocean island of Mauritius to aid in the control of this weed. The second species, *Eurytoma cressoni* Howard, is thought to be a parasite of the first; it is redescribed from fresh material. The third species is a previously undescribed parasitic one which attacks the larva of a weevil, *Microlarinus* sp., which feeds commonly in the stems of the puncture vine (*Tribulus terrestris*) in South India. This weevil may prove to be useful in the control of this weed in the United States, but in India its effectiveness is considerably reduced by the attacks of the *Eurytoma*.

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Eurytoma attiva, new species

Eurytoma sp., Williams, 1951, Mauritius Dept. Agr. Ann. Rpt. 1949, no. 25, p. 64.

This species agrees with *howardi* Dalla Torre (= *mayri* Howard not Ashmead) in having weak facial striae which converge on the mouth opening; in having a longitudinal fold crossing the lateral part of the pronotum; in having the prepectus smooth with the posterodorsal angle tonguelike; in having the propodeum almost vertical, with a broad, median, shallow concavity; in that the petiole of the female is so short as scarcely to be visible; and in having the fourth gastral tergite almost or quite as long as the preceding three tergites combined. The females of these two species differ in that the head in anterior aspect is

more square in *attiva* than in *howardi*; the antennal scape and midfemora are partly dark brown to black in *attiva*, although these structures are entirely yellow to tan in *howardi*; and the propodeal concavity is laterally shagreened in *attiva*, but it is rugulose in *howardi*. The males of *attiva* and *howardi* differ in that the antennal scape in *attiva* is clavate toward the apex, but it is not in *howardi*; the abdominal petiole is longer than the hind coxa in *attiva*, but it is slightly shorter than the hind coxa in *howardi*.

Female.—Length 2.5–3.0 mm. Black; antennal scape tan with more or less extensive dark brown to black shading apically; pedicel tan beneath and black above, flagellum dark brown; mandibles, trochanters, bases and apices of femora, tibiae, and tarsi, tan; wings hyaline, venation tan or yellow; ventral base of gaster red-brown; tips of ovipositor sheaths yellow. Pubescence relatively inconspicuous, silvery; one or two pairs of obscure setae on each of basal three gastral tergites, fourth tergite with three pairs, fifth with one and a partial second irregular row of setae extending completely across tergite near its posterior margin, exposed surfaces of sixth and seventh tergites covered with long, slender setae.

Frons in anterior aspect appearing to be almost square, indistinct striae converging on mouth; antennae inserted slightly below center of frons, apex of scape reaching level of vertex; funicle segments becoming progressively slightly broader and shorter toward apex, so that fifth segment is $1\frac{1}{2}$ times as wide and $\frac{2}{3}$ as long as first; club as long as fourth and fifth funicle segments combined; scrobe cavity with margins acarinate; a faint and irregular carina encircling the compound eye; malar furrow present and complete; postocellar line twice as long as ocellular.

Umbilicate punctures of thoracic notum deep, distinct, interstices strongly shagreened; pronotum with disc of lateral sector with a longitudinal fold; prepectus smooth and shining dorsally, sculptured ventrally, its posterodorsal angle tongue-like; tegula brown, smooth and shining; anterior face of fore coxa excavated and flattened on apical two-thirds of its length; mesosternum

not prolonged anteriorly between bases of fore coxae; forewing with marginal and postmarginal veins equal in length, stigmal vein $\frac{5}{6}$ as long as marginal, submarginal 5 times as long as marginal; hind coxa with deep femoral concavity at apex, surface within this concavity smooth, rest of exposed surface of coxa with irregular, alveolate sculpture, this sculpture more minute on mesal surface than on outer surface.

Propodeum vertical, with a broad, very shallow concavity on meson, this concavity with a median, vertical band of semi-transverse, strong rugae, area of concavity lateral to median band shagreened; propodeal spiracles oval; petiole short, much wider than long, and roughly sculptured; gaster $1\frac{1}{4}$ times as long as thorax, and tergite entirely smooth and shining, second to fifth tergites smooth dorsally; very faintly and minutely sculptured laterally near anterior margins; fourth tergite the longest, being almost or quite as long as first 3 tergites combined; sixth tergite, when seen in lateral aspect, forming a 50° angle with longitudinal axis of gaster.

Male.—Length 2.0–3.0 mm. Antennal scape clavate toward apex; funicle composed of 5 pedunculate segments, first slightly longer and thicker than any one of more distal segments; club two-segmented; petiole longer than hind coxa, ventral apex of petiole smooth, rest of its exposed surface with close, alveolate sculpture; propodeum lacking the broad, shallow concavity of the female, a median, longitudinal groove present with areas lateral to it slightly produced and with rugose, irregular, alveolate sculpture; gaster compressed, $\frac{7}{8}$ as long as thorax, third gastral tergite the longest.

Type locality.—St. Augustine, Trinidad, B. W. I.

Types.—U. S. N. M. No. 64233.

Described from 35♀ and 30♂ specimens as follows: Holotype ♀, allotype ♂, and 13♀ and 10♂ paratypes, St. Augustine, Trinidad, April 1945, reared from inflorescence of *Cordia* sp., R. Donald (specimens received through E. C. McCallan); 1♀ and 1♂ paratypes, St. Augustine, Trinidad, Sept. 1946; 1♀ paratype, Nariva, Trinidad, Nov. 1946, from *Cordia macrostachya* flowers, F. J. Simmonds; 7♀ and 8♂ paratypes, Mauritius, 1949,

reared from seeds of *Cordia macrostachya* from Trinidad, J. R. Williams; 12♀ and 10♂ paratypes, Mauritius, 1950, from seeds of Trinidad *Cordia*, J. R. Williams. Fifteen ♀ and 15♂ paratypes are deposited in the British Museum (Natural History) collection; the rest of the type material is in the U. S. National Museum collection.

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The following species is thought to be a parasite of *Eurytoma attiva*, although it is possible that in part of its larval development its feeding is phytophagous rather than parasitic. As Noble (1940, Roy. Ent. Soc. London Trans. 90: 33) has shown, in some other species of *Eurytoma* the larvae spend part of their lives as parasites, passing the rest as plant feeders. *E. cressoni* was first segregated in material reared from *Cordia* seeds in the Island of Trinidad. Later it was found to have been introduced into the Island of Mauritius in *Cordia* seeds sent there from Trinidad. It was originally determined as an unknown species of *Eurytoma* by A. B. Gahan, formerly of the U. S. Department of Agriculture. Subsequently G. J. Kerrich, of the Commonwealth Institute of Entomology, London, was able to identify it as *Eurytoma cressoni* Howard by comparing specimens with the female type of that species in the British Museum (Natural History) collection. Mr. Kerrich has very kindly checked my redescription against this type.

***Eurytoma cressoni* Howard**

Eurytoma cressoni Howard, 1897, Linn. Soc. London, Zool. Jour. 26: 138; Dalla Torre, 1898, Cat. Hym., v. 5, p. 336; Ashmead, 1900, Ent. Soc. London Trans., p. 338; Schmiedeknecht, 1909, Gen. Ins., fasc. 97, p. 141.

Female.—Length 1.5–2.5 mm. Black; mandibles, antennae, fore and mid legs, hind legs except coxae, tegulae, venter of gaster, and apices of ovipositor sheaths, yellow to tan, but this light color somewhat variable—pedicel sometimes shaded with black dorsally, a faint yellow or tan spot usually on face ventral

to each antennal socket, hind coxae may be partly or almost entirely yellow or tan, and light color may extend from venter onto lateral areas of fourth and fifth gastral tergites or, sometimes, extend over entire surface of fourth gastral tergite; wings hyaline with venation yellow to tan. Pubescence fine, silvery; dense on metepisternum and sixth and seventh gastral tergites.

Antennae inserted slightly below center of frons, apices of scapes reaching level of anterior ocellus; antennal funicle segments equal in width, and gradually decreasing in length, the first somewhat longer than the fifth; club as long as first and second funicle segments combined; scrobe cavity with lateral and dorsal margins obscurely carinate; face with numerous, strong striae converging on mouth opening; compound eye not encircled by a carina; malar furrow complete; postocellar line $2\frac{1}{2}$ times as long as ocellular.

Umbilicate punctures of thoracic notum deep, regular, and closely set, interstices very narrow, shagreened; anterior face of fore coxa flattened and slightly excavated from base to apex; mesosternum not produced anteriorly between fore coxae; prepectus smooth dorsally, sculptured ventrally, its posterodorsal angle bluntly rounded; tegula smooth, shining; forewing with marginal vein twice as long as stigmal and $1\frac{1}{3}$ times as long as postmarginal, submarginal vein $3\frac{1}{2}$ times as long as marginal; hind coxa with a shallow femoral cavity at apex, surface within this concavity slightly sculptured, almost smooth, rest of exposed surface of coxa with uniform alveolate sculpture.

Propodeum vertical, median area of propodeum with a shallow and broad concavity, surface of this concavity shagreened and irregularly rugulose, lacking a median, longitudinal band of rugose sculpture; petiole so short as scarcely to be visible in undissected specimens; gaster slightly compressed, varying from $1\frac{1}{3}$ to $1\frac{1}{2}$ times as long as thorax; fourth gastral tergite as long as basal 3 tergites combined; first gastral tergite smooth, second and third smooth on dorsomedian line and at posterior margins, otherwise with minute, closely set, irregularly alveolate sculpture; fourth tergite completely sculptured except for a pair of lateral sub-basal smooth spots; fifth tergite more minutely sculp-

tured than fourth; apex of abdomen acuminate, ovipositor and seventh gastral tergite directed obliquely dorsad, ovipositor sheaths slightly exerted.

Male.—Length, 1.5–2.0 mm. Color as in female except that light color is less extensive on hind coxae and gaster, and hind tibiae are usually mostly black; antennal scape broadened in basal $\frac{2}{3}$, constricted apically; funicle with 4 pedunculated segments; club three-segmented; propodeum with median concavity deeper and narrower than in female; petiole as long as or slightly longer than hind coxa; gaster not compressed, $\frac{5}{8}$ as long as thorax; third gastral tergite the longest.

Type locality.—Balthazar, Grenada, B. W. I.

Lectotype.—Female, in the British Museum (Natural History).

This species was originally described from a female and male cotypes. The male cannot now be found either in the British Museum (Natural History) or the U. S. National Museum collections, so it is presumed to be lost. The female specimen is hereby designated as the lectotype, and Mr. Kerrich has so labeled it.

Eurytoma cressoni is redescribed from specimens from St. Augustine, Toco, and Nariva, Trinidad and from Mauritius, reared either from the seeds or from the inflorescence of *Cordia macrostachya*. These specimens are divided between the British Museum (Natural History) and the U. S. National Museum collections.

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The name of the following species has long since gotten into the literature, but no description of it has ever been found. Girault's manuscript types of it have been in the U. S. National Museum collection since 1916. T. V. Ramakrishna Ayyar in 1920, in discussing parasites of *Alcidodes bubo* (F.) in South India, said of it: "Two parasites, *Mctastenomylia juliani* Gir., and *Eurytoma pigra* Gir., have been noted on the grub; but not to any great extent." On an accompanying plate he figures a "Chalcidid parasite" of *Alcidodes bubo*, without naming it fur-

ther. The specimen figured is clearly a pteromalid (probably *Metastenomyia*), so that this publication could not be taken to have validated the name *Eurytoma pigra*.

Eurytoma pigra, new species

Eurytoma pigra Girault MS, Ramakrishna Ayyar, 1920, Rpt. Proc. Third Ent. Meeting Pusa, 1919, v. 1, p. 321; Mani, 1938, Cat. Ind. Ins., pt. 23, p. 71; Pruthi and Mani, 1940, Imperial Council Agr. Res., India, Misc. Bul. 30, p. 8; Thompson, 1943, Imperial Par. Serv., Cat. Par. and Pred. Ins. Pests, sect. 1, pt. 1, p. 9.

Eurytoma sp., Ramakrishna Ayyar, 1925, *Spolia Zeylonica* 13: 244.

This species may be distinguished from other oriental species of *Eurytoma* as follows: It differs from *poloni* Girault in lacking a pair of sublateral, longitudinal carinae on the first gastral tergite; it lacks the conspicuously long and stout setae which are borne on the posterior margin of the hind tibia in *setitibia* Gahan; the female abdominal petiole is short, not as long as or longer than the hind coxa, as in *brunneipectus* Crawford; the face has striae converging on the mouth opening, not with unmodified umbilicate punctation as in *albotibialis* Ashmead, although both *pigra* and *albotibialis* have low carinae on the frons running parallel with and close to the anterior margins of the compound eyes; in *hindupurensis* Gahan the mesosternum is prolonged anteriorly as an acute projection between the anterior coxae, although this projection is truncate apically in *pigra*. Other oriental species, such as *systoloides* Crawford and *manilensis* Ashmead, have convergent facial striae, but they lack the low carinae bordering the compound eyes. The anterior coxa has a distinct toothlike projection near the middle of the outer ventral margin in *nesiotes* Crawford, but this projection is wanting in *pigra*. In both *pigra* and *nesiotes* the propodeum has a very broad, shallowly concave median depression.

Female.—Length 2.5–3.0 mm. Black; antennae, trochanters, bases of fore and mid femora, all but bases and apices of mid tibiae, and sometimes base of gaster, dark brown; apices of all

femora, bases and apices of mid and hind tibiae, and mid and hind tarsi, yellow; front tibiae and tarsi tan; wings hyaline with venation yellow. Pubescence of head, body, and appendages short, silvery; gastral tergites 1-3 bare, fourth tergite with a few setae laterally, tergites 5-7 densely setose.

Antennae inserted in center of frons, apices of scapes reaching level of anterior ocellus; funicle segments all subequal in length and width, fifth segment only very slightly shorter and broader than first, club as long as funicle segments 4 and 5 combined; scrobe cavity carinately margined laterally and dorsally; face with strong striae converging on mouth opening; weak but distinct carinae encircling compound eyes, these carinae bordering the frons laterally; malar furrow obsolete; postocellar line 3 times as long as ocellocular.

Umbilicate punctures on thoracic notum shallow, interstices narrow, somewhat irregular, lightly shagreened; prepectus smooth, shining, its posterodorsal angle blunt; anterior face of fore coxa excavated from base to apex; mesosternum produced forward between bases of anterior coxae, its apex truncate, and a short, median, longitudinal carina present; tegulae black, lightly sculptured, almost smooth; forewing with marginal and stigmal veins equal in length, postmarginal $1\frac{1}{3}$ times as long as marginal, submarginal 4 times as long as postmarginal; hind coxae with minute, alveolar sculpture extending completely over exposed surfaces, a deep, concave femoral groove present at apex.

Propodeum almost vertical, lying at an angle of 80° with longitudinal axis of thorax; median area of propodeum broadly and shallowly concave; surface of concavity shagreened and with a median longitudinal band of confused, semi-transverse rugulae, these varying in intensity in different specimens; propodeal spiracles elongate-ovate; petiole extremely short, but discernible; gaster varying from $1\frac{1}{10}$ to $1\frac{1}{6}$ times as long as thorax, first gastral tergite smooth, tergites 2-4 minutely and closely pitted laterally and anteriorly on dorsum; fourth tergite the longest, being twice as long on dorso-meson as third tergite and as long as first and second combined; gaster acuminate at apex, dorsal

surface of sixth tergite, when seen in lateral aspect, forming a 55° angle with longitudinal axis of gaster.

Male.—Length 2.5 mm. Antennal funicle composed of 5 pedunculate segments, first segment slightly longer than any of those following; club two-segmented; femoral groove at apex of hind coxa more shallow than in female; petiole longer than hind coxa, apex of petiole smooth, rest of its surface with minute, alveolar sculpture; gaster compressed and as long as thorax, third gastral tergite the longest, fourth tergite extremely short.

Type locality.—New Delhi, INDIA.

Types.—U. S. N. M. No. 64167.

Described from 11♀ and 1♂ specimens as follows: Holotype ♀, allotype ♂, and 10♀ paratypes, reared at New Delhi, India, July 5, 1957, from *Microlarinus* sp. larvae boring in the stems of puncture vine, *Tribulus terrestris*, G. W. Angalet. Additional specimens, not included in the type series, parasitized larvae of the weevil, *Alcidodes bubo* (F.) in *Sesbania*, Coimbatore, India, Aug. 7–24, 1916, Ramakrishna Ayyar. The latter specimens, all more or less broken, are Girault's manuscript types. Two ♀ paratypes are deposited in the British Museum (Natural History) collection; the other specimens are in the U. S. National Museum collection.

A New Species of *Conosphaeron* Linsley from Arizona (Coleoptera: Cerambycidae)

By JOSEF N. KNULL, Department of Zoology and Entomology,
The Ohio State University, Columbus 10, Ohio

This interesting specimen appears to belong to genus *Conosphaeron* Linsley (1935).

Conosphaeron pullum n. sp.

Female: Dark brown throughout, shining on both surfaces.

Head coarsely densely punctured, sparsely clothed with long hairs; eyes coarsely granulated; antennae extending beyond